CO-OP MINING CO.

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NOV. 26, 1982

SCALEHOUSE MODIFICATION

Wendell Owen

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Docket # 84-040
Cause # ACT/015/025

UMC783.14 Geology Description

We have not vet received the contour maps or the results of the test samples for the development of the upper storage pad, so we are requesting an extension of time for that portion only of the modified plan. We agree to not enter or use that portion of the permit area for any purpose, for mining operations or further construction untill that portion of the modification has been completed.

UMC 783.25 Cross- sections, Maps and plans

(k) Please refer to Plate III-8-b-1 and III-9-b-2

Roads. Please refer to 784.24 of this package.

Surface structures will consist of; a shop, parts warehouse, bath house, mine offices, lamp house, truck scales, weighmans office, caretaker dwelling, mine run coal receiver bin, crushing and sizing structure, truck load-out bins, stockpile towers, and conveyors to carry coal to the storage and loadout sites. These structures will have cement footings and will be constructed with cincrete blocks and/or steel. These will each be used for the purpose as designed (shop for repair and maintenance of equipment, bath house for showers and lockers, etc.). They will be maintained by painting and repairing as needed. Moving parts such as conveyors will be maintained by regular greasing and by replaceing worn parts as needed.

Upon completion of mining operations, all structures will be removed, including the cement footings and the land will be returned to the approximate original configuration in preperation for final reclamation.

UMC 784.13 Reclamation Plan

(b)(4) Prior to disturbance of areas used for mining operations, the topsoil has been removed, or in the case of possible additional disturbance will be removed and stockpiled for future use. An example of procedure for removal is the area of modification for the truck scales. Por tions of this area were extremely rocky, while other portions had a topsoil depth of about 18 inches. The entire depth of topsoil was removed from the better areas, and enough topsoil saved to cover the entire area to a depth of at least 8 inches at the time of final reclamation. A berm has been made at the bottom of the stockpile. a sign has designated it as topsoil and it will be reseeded to protect it from wind and water erosion.

(b)(4)(vii) Applicant requests a meeting with the Division to discuss guidlines and help in devising a sampleing program as suggested in the ACR. (See ACR 817.116).

(b)(1) In order that roads may be used for access to remove and reclaim all of the other facilities, the roads will be the last area to be reclaimed. When all other r eclamation is completed, the roads will be reclaimed except if any portion of the road or roads are needed for post mining land use

(b)(3) Final configuration will be as near as possible to the original contour of the area before disturbance. For maps and cross-sections see Plate III-8-b and III-8-b-1.

(b)(5) Contemporaneous reclamation for embankments, topsoil stockpiles, and etc. will include the following seed amounts and procedures;

Crested wheat grass	6# PLS per A.
Yellow sweet clover	6# PLS per A.

The best results in reseeding that we have attained in this area has been to scarify the ground, broadcast the seed and harrow the seed in lightly, as late as possible in the fall and still have the planting under the winter snow. The proper time for this is the first week in November. Any snow that falls before that time will melt off again before winter. This method has been very successful without the use of mulch, as the seed germinates immediately after the melting of the snow from the moisture of the snow melt. The use of yellow sweet clover in the seed mix adds to the success of the planting as it is very easy to get started under almost any condition, provides a cover to assist the other plants in starting, and adds to the nutrients of the soil. It is often used as a rotation crop by farmers as a soil builder. It is bi-ennial and helps control erosion while the perennials get a full stand and native plants from adjacent areas spread into the reseeded area. Irrigation will not be used due to nature of the terrain as results would be spotty at best. It is not needed if the planting is under the snow as described above. The on ly exception will be in the case of small areas near a building that has water pressure for sprinkling. Contemporaneous reclamation of these small areas will take place at any time of the year as soon as the earthwork is completed. For these plantings a straw mulch will be used and irrigation will be by sprinkling.

Soil samples have been collected from various topsoil sites and tested by agriculture consultants. The results of these analyses and recommended nutrient additives are included under this cover as 'Exibit #1'.

UMC 784.13 (b)(5) cont.

2. Final abandonment

Upon completion of mining operation, the portal(s) shall be permanently sealed to prevent entry. Permanent seals will be designed to withstand any anticipated water pressure that may develop.

All machinery, equipment, and structures shall be removed from the permit area in not more than six months from the date of the completion of mining operations.

Dams, ponds, and diversions will be regraded to the approximate original contour of the land; except if that diversion is a barrow pit adjacent to, or a part of a road or pack trail that is to be left as a permanent road or trail.

Backfilling and grading

Disturbed areas will be backfilled and graded in not more than six months from the date of completion of the removal of surface structures, snow depth and weather permitting, or six months from the date the work can begin.
Backfilled material shall be pleced to minimize adverse effects on ground water, minimize off-site effects, and to support the postmining use.

Highwalls will be removed or reduced except where the highwall is permanently stable and/or said removal will endanger the life of the machine operator attempting the removal.

Backfilled areas shall be restored to a contour that is compatible with the natural surroundings and is capable of supporting the post mining land use. Where practicable and appropriate, such contour shall the approximate original contour.

Cut and fill terraces will be used where required in order to conserve soil moisture, ensure stability, and control erosion on final graded slopes. Terraces will meet the requirements of UMC 817.101 (4) (i) thruogh (iv).

Redistribution of soil will include covering all debris, coal or other materials constituting a fire hazard, in a place and manner designed to prevent contamination of ground or surface water. Soil will be compacted or otherwis stabilized in preparation for reseeding.

Revegitation.

The soil that has been redistributed and compacted will be covered with the surface material from the stockpiles, or other soil that has been tested and found to be suitable and able to support vegitative cover. Soil will be prepared for seeding by harrowing or final grading.

A description of the vegetation prior to surface disturbance is as shown on the following inventory taken by the Soil Conservation Service. Most of the disturbed area is along the boundary line between Pit 1 and Pit 2 of the SCS survey and would be a blending of the two rather than a distinct line. The seed mixture as shown in Chapter III Exibit 'h' in our permit application (also here enclosed) was chosen because it was recommended to us by the Utah State Experimental Station as being readily adaptable to the local climatic and soil conditions, having good potential for rapid development of cover, and contributing to possible post mining land use such as grazing or wildlife use. The plants from these seeds are not poisonous or noxious.

We have also enclosed a copy of appendix B table 1 of Utah Division of Wildlife resources 'Fish and wildlife Resource Information' of recommended seed mixtures that will benefit wildlife. Many of the plant species are the same on both seed mixture lists, but if in the opion of the OGM Division it would be better to modify the plan to use the seed mixture in table 1 in place of the one in Exibit 'h' we would be glad to do so.

CHAPTER III _ Exibit 'h'

SEED MIXTURE

Crested wheat grass	6# per acre
Luna pubescent wheat grass	2# per acre
Russian wild rye	6# per acre
Yellow sweet clover	6# per acre
Ladac alfalfa	2# per acre
Small burnet	2# per acre
Sage brush	1/4# per acre
Rabbit brush	1/4# per acre
Four wing salt brush	1/4# per acre

Amounts are given in PLS.

DESCRIPTION OF PRESENT VEGETATION

Upland Stony Loam (Pinyon-Juniper) Ecological Site

Two inventories of the Upland stony loam (P-J) ecological sites in the Bear Canyon area recorded the following vegetation as a percentage of air dry weight:

1) Pit 1, SW¼, Sec. 24, T16S, R7E. This site relates to the D1G soil.

2) Pit 2, NW¼, Sec. 25. T16S, R7E. This site relates to the D2E soil.

	Percent	
Grass and Grass-like Plants	Pit 1	Pit 2
Indian ricegrass	5	5
Salina wildrye	25	10
Squirreltail		10
Sedge		2
Needleandthread		2
Muttongrass	T	1
Forbs		
Buckwheat	1	
Mustard	1	2
Aster	1	2
Other	2	2
Crytantha		2
Stickseed		2
Trees and Shrubs		
Rubber rabbitbrush		5
White fir	5	
Douglas fir	5	5
Pinyon pine	30	25
Juniper	10	10
Rocky Mountain juniper	10	5
Curlleaf mountainmahogany	5	
Big sagebrush		5
Bluerberry		5
Total annual Production (estimated in pounds/acre)	900	1500
Ecological rating	Good	Good

Table 1. **Recommended seed mixtures that will benefit wildlife through enhancement of moderately disturbed shrublands habitats of the montane ecological association. Also included are acceptable alternatives if seed for a plant species is not available. Alternatives marked with an asterisk (*) are for use in special treatments such as erosion control or roadbank stabilization. If disturbance was severe and total reclamation is needed, increase amount of seed by a factor of 2 to 3 times. Information assembled from Plummer, A.P., D.R. Christensen and S.B. Monsen. 1968. Restoring big game range in Utah. Utah Division of Fish and Game (now Utah Division of Wildlife Resources) Publication No. 68-3. 183 pp. Also from personal contacts with A. Perry Plummer.**

Species	North exposures and shady areas		Sunny exposures (south, west, east)	
	Broadcast	Drilled	Broadcast	Drilled
	-Pounds per acre-			
Grasses:				
Fairway crested wheatgrass	2	1	2	1
Smooth brome (southern strains)	4	2	2	1
Intermediate wheatgrass	4	2	2	1
Pubescent wheatgrass	0	0	2	1
Bluestem wheatgrass	0	0	1	1/2
Orchardgrass	1	1/2	1	1/2
Russian wildrye	0	0	1	1/2
Tall oatgrass	1	1/2	0	0
Forbs:				
Alfalfa (Nomad, Rambler, Travois, Ladak-equal parts)	2	1	2	1
Chickpea milkvetch	0	0	1	1/2
Utah sweetvetch	0	0	1	1/2
Yellow sweetclove	0	0	1	1/2
Arrowleaf balsamroot	1	1/2	1	1/2
Pacific aster	1	1/2	1	1/2

Mixture for tall mountain brush type, shaded sites.

Species	Seeding per acre
	Pounds
Grasses:	
Smooth brome (southern strain)	5
Fairway crested wheatgrass	1
Intermediate wheatgrass	3
Orchardgrass (Utah grown)	2
Tall oatgrass	1
Mountain brome	1
Forbs:	
Alfalfa (creeping strains or Ladak)	1
Pacific aster	1/4
Oneflower hellianthella	1/2
Showy goldeneye	1/4
Totals	15

Table 1. Continued

Species	North exposures and shady areas		Sunny exposures (south, west, east)	
	Broadcast	Drilled	Broadcast	Drilled
	-Pounds per acre-			
Shrubs:				
Rubber rabbitbrush	1/2	1/4	1/2	1/4
Douglas rabbitbrush	1/2	1/4	1/2	1/4
Big sagebrush	0	0	1/2	1/4
Fourwing saltbush	0	0	1	1/2
Totals	17	8 1/2	20 1/2	10 1/4
Shrubs for pits, major disturbance areas, cleat marks, and drilled areas:				
Antelope bitterbrush	1	1/2	2	1
Golden currant	1/2	1/4	1/2	1/4
Birchleaf mountain mahogany	1	1/2	1/2	1/4
Curlleaf mountain mahogany	0	0	1/2	1/4
Cliffrose	0	0	1/2	1/4
Green ephedra	1/2	1/4	1/2	1/4
Fourwing saltbush	0	0	1	1/2
Woods rose	1	1/2	1/2	1/4
Saskatoon serviceberry	0	0	1	1/2
Totals	4	2	7	3 1/2

DEC [illegible].16, .22, .23

1-Plate III-9-b (please note that additions have been made to this map that includes the information asked for that was not on the original map turned in for the modification).

2- Plate III-7-b

Size of catch basin

10 year 24 hour rainfall experience	2.4 in.	.2 ft.
75% runoff		.15 ft.
Acres draining into catch basin		1.2
Basin storage required		.18 A. ft.
Sediment storage required		.12 A. ft.
Basin area	2,000 sq. ft.	25 ft. X 80 ft.
Height sed. storage	2.6 ft.	
Height water storage	4 ft.	
Freeboard	1.4 ft.	

Culvert

Length	100 ft.
Diameter	60 in.

[illegible] topsoil plant maps and plans

Cross-section of topsoil stockpile. See Plate 8-b-1

Upper storage pad. Request extention (refer to heading 783.14 of this package).

UMC 784.24 Transportation Facilities

Topographic map of roads and parking. Plate III-8-b

(a) Cross sections: Haul road Plate III-9-b (modification)
Supply road Plate III-8-b-1 Section B-B
Road cut and fill embankment III-13-b
Culvert III-12-b
Drainage ditch III-8-b-1 Section C-C

Haul roads will be a width of 30 feet road surface, not including the width of drainage and/or diversion ditches at the side of the road.

Supply and equipment roads will be 20 to 25 feet wide, not including the width of drainage and/or diversion ditches at the side.

The access road to the portal was constructed with a dozer by the cut and fill method. The average grade is 8% with sections of not more than 200 feet of up to 12%. Culverts are placed at the points were the natural drainages in the mountain intersect the road to minimize the amount of water that will flow down the divirsion ditch that was constructed along the side of the road. When completed, the road will be surfaced with a crushed road base material and treated with ammonium chloride for dust control. This road will be used by the people going to and from work and for vehicles hauling supplies to the mine. The access road to the screenage plant was an old existing road that has been graded and restored, and will be finished in the manner described above. It will be used by the people going to and from work at the screenage plant and for repair andmaintenance vehicles. These roads will be maintained by grading and reapplication of water and/or chemicals if needed. The main haulage road was an old existing road gradedand restored and when completed, will be surfaced with a crushed road base material and treated with ammonium chloride for dust control. The average grade is 4%, which remains consistant throughout the entire length of the road without steeper strecheS. Culvert are placed at the points where tha natural drainages intersect the road, but not exceeding 800 feet spacing. This road will be used for access to the minesite and to transport coal away from the mine.
For reclamation please refer to 784.13.

There is no public road within 100 feet of the permit area, except where the mine haul road joins t hat right of way.
Conveyor systems consist of covered belts which carry the coal from the screenage plant to the stockpile area. Maintenance includes regular servicing and replacing of worn parts when necessary. This will be included in the maintenance program we have for the entire operation. For dust control measures see 784.25.

784.25 Fugitive dust control plan

A copy is included, of a dust control plan that has already been submitted and approved by the Bureau of Air Quality, in the Bear Canyon permit application. Please seeChapter XI, Exibit XI-b

CO-OP MINING COMPANY _____ DUST CONTROL (BEAR CANYON) May 5, 1980

	UNCONTROLED		FACTOR	CONTROLED	
HAUL ROADS	73.17 T.	PER YEAR	85%	3.476 T.	PER YEAR
ACCESS ROADS	3.59	"	85%	.54	"
COAL STORAGE	5.25	"	50%	2.625	"
CONVEYORS	10	"	99%	.2	"
CRUSHER	2	"	99%	.02	"
SCREENS	10	"	99%	.1	"
PRODUCT REMOVAL	5	"	50%	2.5	"
TOTAL	69.01	"		9 461	"

CO-OP [illegible] COMPANY_____DUST CONTROL (BEAR CANYON) May 5, 1980

STORAGE PILE (COAL)

AVERAGE SIZE OF PILE 4,000 T. (10,000 T. CAP. — NORMALLY LESS THAN 1,000 T.)

THROUGH-PUT 200,000 T. PER YEAR

k = 9.125

s = 20

d = 175 (HIAWATHA WEATHER STATION — 151 DAYS SNOW COVER —39 ADDITIONAL DAYS .01 IN. OR MORE OF RAINFALL)

$E = .05 \cdot \frac{20}{1.5} \cdot \frac{175}{235} \cdot \frac{15}{15} \cdot \frac{9.125}{90} = .0525 \cdot 200{,}000$ T. = 5.25 T. PER YEAR

CONTROL — COAL IS SPRAYED WITH WATER AS IT IS BEING MINED IN ORDER TO MEET UNDERGROUND DUST CONTROL REQUIREMENTS. ADDITIONAL SPRAY EQUIPMENT WILL BE INSTALLED AT THE STORAGE SITE TO USE IF NEEDED.

CRUSHING (PRIMARY ONLY) 200,000 T. • .02 = 4,000# = 2 T. PER YEAR

CONTROL — ENCLOSED AND VENT TO BAG HOUSE

SCREENING 200,000 T. • .1 = 20,000# = 10 T. PER YEAR

CONTROL — BAG HOUSE

CONVEYORS AND TRANSFER POINTS 200,000 T. • .2 = 40,000# = 20 T. PER YEAR

CONTROL — ENCLOSED AND VENT TO BAG HOUSE

ROADS (HAUL) — s = 15
S = 20
W = 190

E = 5 • .47945 = 2.39725 @ 19333.33 MILES PER YEAR = 23.17 T. PER YEAR

CONTROL — CHEMICAL STABILIZATION

ROADS (ACCESS) s = 15
S = 10
W = 190

E = 2.5 • .479452 = 1.1986 @ 6000 MILES PER YEAR = 3.59 T. PER YEAR

CONTROL — CHEMICAL STABILIZATION

PRODUCT REMOVAL 200,000 T. PER YEAR • .05 = 5 T. PER YEAR

CONTROL — WATER SPRAY

UMC 817.22 Topsoil removal

Please refer to 784.13 (b)(4) of this package.

Area of scale area modification 1.2 acres.

Area of upper pad modification, please refer to 783.14 of this package.

Results of analysis of soil; please refer to Exibit '1'.

UMC 817.23

Please refer to 784.13 (b)(4) and (b)(5) of this package.

UMC 817.24

Upon final reclamation, topsoil will be applied to a depth of 3 to 4 in.

Umc 817.25 Soil nutrients will be added to the topsoil as needed as indicated by the above analysis.

Docket # 84-040
Cause # ACT/015/025

Co-op Mining Co.

H/C
4-27-84

SECTION 7

HYDROLOGY

SCOPE AND INVESTIGATIONS

The purpose of this section is to provide background information on the hydrogeology characteristics of the Co-Op Mining Company's Bear Canyon Mine permit area and the surrounding regional area. Also to present a plan of action for complying with the requirements of the Office of Surface Mining (OSM) and the Utah Division of Oil, Gas and Mining (DOGM). In particular, this section includes an evaluation of the geological and hydrological setting of the mine, its relation to the regional ground water and surface water hydrology and its probable impact on the groundwater and surface water systems.

Information gained from field reconnaissance and a review of data from various sources was used in compiling this section. The data sources included information from the Co-Op Mining Company, reports by the U. S. Geological Survey, Utah Geological and Mineral Survey, U. S. Forest Service and mine application permits on file with OSM (specifically those in the Huntington Canyon area).

7.1 GROUNDWATER HYDROLOGY

7.1.1 REGIONAL AREA

The Bear Canyon Mine is part of the Wasatch Plateau coal field which in turn is part of the High Plateaus area of the Upper Colorado River Region. Available data on groundwater resources for this area is rather scarce. Most of the water supply development has been limited almost entirely to surface water. In general, what records are available are the result of information gathering on specific problems, mostly gas and oil wells, rather than as part of a continuous data-gathering program. Previous experiences at local area mines are the best data sources.

The Wasatch Plateau has been characterized as a groundwater recharge area. The high elevations with the resulting large snowfalls combine with the generally flat profile of the plateau in enhancing infiltration of water. Despite this, practically all precipitation is consumed at or near the place of fall by sublimation and evapo-transpiration or becomes overland run-off. The water that does infiltrate into the ground generally discharges within a short distance as springs or seeps. Only about 4 percent of precipitation is estimated to become groundwater recharge (Price and Arhow,'74).

The groundwater yield from the Wasatch Plateau strata is usually very low. For the most part, the strata consist of consolidated and semi-consolidated sedimentary rock which have low hydraulic conductivities and specific yields between .2 and 2.0 percent. Yields to individual wells are generally less than 50 gpm. Higher yields might be available

from the Star Point Sandstone stratum or from local perched water zones. Ordinarily, however, perched water bodies could not sustain large perennial yields (Price and Waddell,'73).

7.1.2 MINE PLAN AND ADJACENT AREAS

Groundwater for the area seems to be derived from snowmelt. The recharge occurs on the plateau top with the snowmelt infiltrating the strata through faults and rock fractures. In order to determine the source of recharge; samples of water from rain, snow, springs, seeps and mines were analyzed for concentrations of deuterium. The results of the analyses showed that deuterium concentrations were similar in snow, spring and mine water but were different in rain water (snow and spring values: -120 to -154, rain values: -54 to -85; Danielson,'81). See Table 7-1.

Recharge for the Bear Canyon area comes from water percolation and infiltration on Gentry Mountain and Ridge. The downward vertical movement of water is commonly impeded by low permeability beds of shale and mudstone in the North Horn, Price River, and Blackhawk Formations. Much of the recharge from snowmelt in the higher parts of the region is discharged by a large number of springs close to the original recharge areas. The water is discharged by springs and seeps where the low permeability rocks outcrop at the land surface, particularly along the sides of the many deep canyons' walls.

Groundwater generally moves from areas of recharge in the higher parts of the region in a southerly direction to areas of discharges.

TABLE 7–1

--Concentrations of deuterium in rain, snow, spring waters, and waters in mines
[Analyses by Centre D'Etudes Nucleaires de Saclay, France]

Location: See explanation of data-site-numbering system in text, plate 1, and figure 16.
Source: 1, rain; 2, snow; 3, spring water; 4, Wilberg Mine water; 5, Deer Creek Mine water.
Date: As shown except for source 1, accumulated rain June-October 1978; source 2, core of accumulated snow October 1978-May 1979.
Altitude: In feet above National Geodetic Vertical Datum of 1929.
Value: Value = $\frac{(D/H)\text{ sample} - (D/H)\text{ SMOW}}{(D/H)\text{ SMOW}} \times 1{,}000$;

where

H = hydrogen content,
D = deuterium content, and
SMOW = Standard Mean Ocean Water (Craig, 1961).

Location	Source	Date	Altitude	Value	Location	Source	Date	Altitude	Value
(D-14-6)7cbb	2	–	8,520	–147.1	(D-16-7)35abc-S1	3	8- 9-79	6,620	–123.2
13cdb	2	–	8,520	–147.1	(D-16-8)5bac-S1	3	5-16-79	8,400	–120.8
14daa	1	–	8,350	–84.5	(D-17-6)11cdc	2	–	8,100	–141.7
21dca	2	–	9,020	–121.2	23aaa-S1	3	8- 9-79	7,766	–127.6
28abc	1	–	8,860	–84.3	25bdd	1	–	7,280	–54.4
(D-15-6)13dad-S1	3	8-23-79	8,320	–129.9	(D-17-7)5cad-S1	3	5-16-79	9,320	–153.7
(D-15-7)5dbb	2	–	8,020	–140.3	10cbd	5	8- 2-79	–	–125.8
29dca	2	–	7,520	–125.5	10ccb	5	8- 2-79	–	–122.5
34cdd-S1	3	8-22-79	8,000	–125.9	16aad	5	8- 2-79	–	
34dac	2	–	8,000	–122.8	16cdd	5	8- 2-79	–	–123.2
35cbc-S1	3	8- 4-78	8,010	–126.7	18abb-S1	3	8- 8-79	8,980	–125.1
35dba	2	–	9,060	–145.8	18dcd-S1	3	8- 8-79	8,960	–125.7
(D-16-5)16ddb	2	–	9,820	–148.0	20cca	4	7- 5-79	–	–121.6
(D-16-6)1aca-S1	3	11- 8-78	8,320	–125.5	20ccb	4	7- 5-79	–	–122.7
	3	7-19-79	8,320	–124.9	20dcc	4	7- 5-79	–	–122.2
23cad	2	–	10,200	–145.2	21aab	5	8- 2-79	–	–123.2
27aaa	2	–	9,250	–137.0	21bad	5	8-30-78	–	–123.7
27adb	1	–	9,120	–77.8	21cbc	4	7- 5-79	–	–122.2
(D-16-7)9cbd-S1	3	10-13-78	7,600	–124.7	21dbd	5	8- 2-79	–	–122.5
	3	8- 3-79	7,600	–124.1	21dda	4	8-30-78	–	–123.8
13bac-S1	3	5-16-79	9,180	–119.8	22abd	5	8- 2-79	–	–122.3
17ccb-S1	3	9- 5-78	8,060	–122.5	22cab	4	7- 5-79	–	–121.8
21bbb-S1	3	9- 5-78	7,600	–124.8	22ccb	4	8-30-78	–	–122.1
22bbb-S1	3	9- 7-78	7,220	–127.9	22cdc	4	7- 5-79	–	–121.7
23ccb	2	–	7,020	–136.6	27bac	4	7- 5-79	–	–123.1
26adc-S1	3	5-11-79	7,120	–124.0		4	7- 5-79	–	–122.3
26bca-S1	3	8- 9-79	6,860	–125.5	28abc	4	8-30-78	–	–122.2
28cba	2	–	7,680	–123.7	28bad	4	7- 5-79	–	–121.9

Except where folded, the regional dip of rocks in the area generally is in a southerly direction at angles that rarely exceed 4 degrees (Danielson,'81). Most of the horizontal movement of groundwater of any significant distance is in the Star Point-Blackhawk aquifer. The Star Point formation seems to be the limit of vertical movement for local groundwater because of the impermeability and thickness of the underlying Mancos shale.

The rate of groundwater moves varies greatly throughout the area as pointed out below.

> "The rate at which water moves through the groundwater system depends largely on the permeability of the rock through which water flows. It may take only a few days for water to flow through solution cavities in the Flagstaff Limestone from recharge area to discharge point; it may take years for water to travel the same distance through the less permeable Blackhawk Formation. Six water samples from the Star Point-Blackhawk aquifer were collected in 1979 from seepage areas...and from springs... All six samples contained detectable concentration of tritium, indicating that at least some of the water had been recharged to the system within the past 10 to 30 years.
>
> Rapid movement of water through the groundwater system is indicated by the rapid response of spring discharge to changes in recharge. Generally, prior to construction of Electric Lake in 1972, most of the discharge of Huntington Creek during the fall of each year was derived from groundwater discharge. The magnitude of base flow at gaging station 09328000 during November correlates well with the water content of the previous April 1 snowpack; it reflects a rapid response in base flow to melting of the snow and resulting groundwater recharge." (Danielson,'81)

The relative imperviousness of most of the rock strata of the area inhibits groundwater movement, what rapid movement there is is along fault lines and through fractured rock.

7.1.2.1 MINE PLAN AQUIFERS

The only regionally recharged aquifer in the mine plan or adjacent areas is the Star Point-Blackhawk aquifer. This aquifer is the source for the Bear Canyon Spring and most of the large perennial springs in the vicinity. According to Mr. Bruce N. Kaliser, State Hydrologist (see Appendix 7-A), what is happening with the aquifer in the vicinity of the mine is "...to the north where principally the snow accumulates on Gentry Mountain, there is a recharge that is vertical down to the water table through the Blackhawk, and there is a recharge also from those channels which are from those drainages which are lying along the joint and fault bed. That vertical migration then reaches the Star Point and travels laterally along shear zones, prominent joint or faults and emerges where topography dissects the formation. I think all this is happening well below the mine."

Mr. Kaliser also mentioned, "I don't believe that at that locality (Bear Canyon Mine) there is precipitation recharging the aquifer, and so I am of the opinion that the mining operation will not affect the discharge on the spring (Bear Canyon Spring)."

The water in the aquifer is mainly used indirectly where it is the supply source for numerous springs. Groundwater development for the whole region is very low, with most water development being associated with surface water.

Other than Star Point, any aquifers in the mine plan area would be local perched water zones. Recharge available to any perched zone would be limited because of the topography and stratum geology of the area. The majority of water movement in the region is through faults and fractures, "But in entering the mine that Co-Op will be going into, it appears that faults evident in that mine underground are tight..." (Kaliser,'80), again limiting the amount of water available to any perched water zones present.

7.1.2.2 QUALITY AND QUANTITY OF GROUNDWATER

In 1981 the U. S. Geological Survey conducted a hydrological study of the upper drainages of the Huntington and Cottonwood Creeks (W.R.I. Open-file Report 81-539, Danielson). As part of this study spring water from various geological stratum units in the region were measured, sampled and analyzed. A summary of the results are shown in Table 7-2. Figure 7-1 shows the relationships of the formations.

It should be noted that none of the formations yielded a total dissolved solids higher than 750 mg/l and anything less than 1,000 mg/l T.D.S. is considered fresh water. Table 7-3 shows the comparison between the results of a chemical analysis (Danielson) done on Bear Canyon Spring and Federal and State water standards. It should be noted that the spring was within standards for all parameters measured.

Only a very small amount of groundwater quality information is available for the Bear Canyon Mine Vicinity. As part of the above mentioned study, field measurements and chemical analysis were performed on

TABLE 7-2

Summary of chemical characteristics of spring waters from different water-bearing zones in and adjacent to the upper drainages of Huntington and Cottonwood Creeks

			Milligrams per liter							
	pH (units)	Temperature (°C)	Dissolved calcium	Dissolved magnesium	Dissolved sodium	Dissolved potassium	Dissolved chloride	Dissolved sulfate	Dissolved solids	Bicarbonate
North Horn Formation										
No. Samples	51	51	51	51	51	51	51	51	43	51
Mean	7.5	6.3	61	29	19	.9	9.8	32	290	320
Minimum	6.3	.1	15	2.0	1.2	.2	1.2	2.1	63	49
Maximum	8.5	17.0	100	63	94	1.9	54	180	633	500
Price River Formation										
No. Samples	18	18	18	18	18	18	18	18	17	18
Mean	7.5	6.3	63	18	5.7	1.3	5.1	23	220	260
Minimum	6.5	3.8	12	2.9	1.4	.4	1.5	3.7	50	39
Maximum	8.2	16.0	87	51	39	3.4	18	120	524	427
Castlegate Sandstone										
No. Samples	9	9	9	9	9	9	9	9	9	9
Mean	7.5	5.6	60	29	7.1	1.3	5.6	33	290	300
Minimum	7.1	2.2	41	14	2.1	.9	3.6	4.0	163	183
Maximum	8.1	7.5	79	41	23	2.4	14	110	385	370
Blackhawk Formation										
No. Samples	31	31	31	31	31	31	31	31	30	31
Mean	7.4	6.1	57	19	4.1	1.1	4.3	21	220	250
Minimum	6.3	.1	15	2.0	1.2	.2	1.2	2.1	53	49
Maximum	8.1	13.0	98	52	16	3.5	16	120	539	460
Star Point Sandstone										
No. Samples	19	19	19	19	19	19	19	19	18	19
Mean	7.3	6.6	75	40	8.0	2.0	6.9	77	370	350
Minimum	6.8	2.8	48	3.0	.1	.9	2.7	13	213	244
Maximum	8.4	11.0	120	89	26	4.9	27	300	750	427
All Units										
No. Samples	128	128	128	128	128	128	128	128	132	128
Mean	7.5	6.3	62	27	11.0	1.2	7.1	34	295	300
Minimum	6.3	.1	12	2.0	.1	.2	1.2	2.1	50	39
Maximum	8.5	17.0	120	89	94	4.9	54	300	750	500

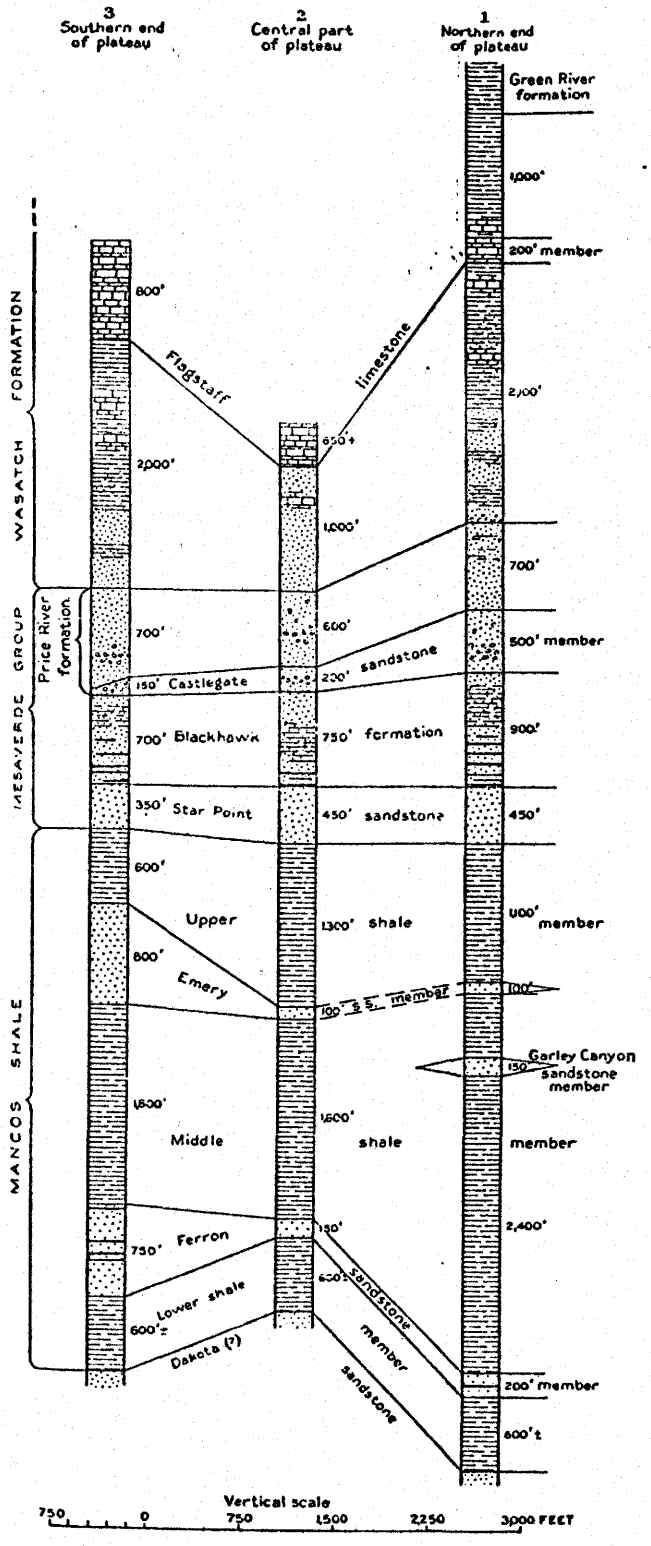

FIGURE 7-1 - COLUMNAR SECTIONS OF ROCKS IN THE WASATCH PLATEAU COAL FIELDS

TABLE 7-3

COMPARISON OF BEAR CANYON SPRING WATER QUALITY DATA W/STANDARDS
OCTOBER 3, 1977

	Spring	Federal Drinking Water Criteria	Utah Division of Health Water Standards	
			Domestic Water Class 1A	Aquatic Life Class 3A
pH (units)	6.8	6.5 - 8.5	6.5 - 9.0	6.5 - 9.0
Temp (C°)	9.5	----	----	less than 20
Spec Cond (umhos)	550	----	----	----
TDS (mg/l)	303	500	Case by case basis	
Iron (mg/l) (total-dissolved dissolved)	----	0.3 total	----	0.05
Sulfate (mg/l)	26	250	----	----
Chloride (mg/l)	4	250	----	----
Calcium (mg/l)	78	200	----	0.002
Magnesium (mg/l)	30	150	----	----
Sodium (mg/l)	4.1	200	----	----
Bicarbonate (mg/l)	310	500	----	----
Carbonate (mg/l)	0	----	----	----
Fluoride (mg/l)	.1	0.7 - 1.2	1.4 - 2.4	----
Silica (mg/l)	6.6	----	----	----
Total ALK as $CaCo_3$	250	----	----	----
Boron (mg/l)	.02	----	----	----
Potassium (mg/l)	1.1	----	----	----
Strontium (mg/l)	.28	----	----	----

TABLE 7-4

Field determinations of discharge, specific conductance, pH, water temperature and alkalinity at selected springs -- Continued

LOCATION	GEO-LOGIC UNIT	DATE OF SAMPLE	ALTI-TUDE	DIS-CHARGE (GAL/MIN)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	ALKA-LINITY FIELD (MG/L) AS $CACO_3$
D-16-7)26ADC-S1	211SRPN	78-04-27	7120.00	110	--	--	--	--
	211SRPN	78-05-26	7120.00	110	--	--	--	--
	211SRPN	78-06-09	7120.00	120	--	--	--	--
	211SRPN	78-06-23	7120.00	130	--	--	--	--

TABLE 7-4

Field determinations of discharge, specific conductance, pH, water temperature and alkalinity at selected springs -- Continued

LOCATION	GEO-LOGIC UNIT	DATE OF SAMPLE	ALTI-TUDE	DIS-CHARGE (GAL/MIN)	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	ALKA-LINITY FIELD (MG/L) AS $CACO_3$
(D-16-7) 26ADC-S1	211SRPN	78-04-27	7120.00	110	--	--	--	--
	211SRPN	78-05-26	7120.00	110	--	--	--	--
	211SRPN	78-06-09	7120.00	120	--	--	--	--
	211SRPN	78-06-23	7120.00	130	--	--	--	--
	211SRPN	78-07-06	7120.00	150	--	--	--	--
	211SRPN	78-07-28	7120.00	150	--	--	--	--
	211SRPN	78-08-10	7120.00	160	--	--	--	--
	211SRPN	78-08-30	7120.00	155	--	--	--	--
	211SRPN	78-10-13	7120.00	165	--	--	--	--
	211SRPN	78-10-25	7120.00	160	--	--	--	--
	211SRPN	78-11-01	7120.00	155	--	--	--	--
	211SRPN	78-12-13	7120.00	145	--	--	--	--
	211SRPN	79-03-07	7120.00	135	--	--	--	--
(D-16-7) 26BCA-S1	211SRPN	78-05-25	6860.00	23	--	--	--	--
	211SRPN	78-08-10	6860.00	19	--	--	11.0	--
	211SRPN	78-10-11	6860.00	19	--	--	11.0	--
	211SRPN	78-11-07	6860.00	19	--	--	10.5	--
	211SRPN	78-12-13	6860.00	19	--	--	10.0	--
	211SRPN	79-06-14	6860.00	10	--	--	11.0	--
	211SRPN	79-06-28	6860.00	10	720	8.0	11.0	--
	211SRPN	79-07-20	6860.00	9.3	660	7.0	11.5	--
	211SRPN	79-08-22	6860.00	21	750	--	10.5	--
	211SRPN	79-09-17	6860.00	19	750	--	10.5	--
	211SRPN	79-10-16	6860.00	20	680	--	11.5	--
(D-16-7) 26CBB-S1	211SRPN	78-08-10	6950.00	57	--	--	11.0	--
	211SRPN	78-10-11	6950.00	57	--	--	10.0	--
	211SRPN	78-11-07	6950.00	57	--	--	10.0	--
	211SRPN	78-12-13	6950.00	57	--	--	10.0	--
	211SRPN	79-05-10	6950.00	44	--	--	--	--
	211SRPN	79-06-28	6950.00	30	820	7.6	10.5	--
	211SRPN	79-07-16	6950.00	27	710	7.0	12.5	--
	211SRPN	79-09-18	6950.00	65	760	--	9.5	--
	211SRPN	79-10-18	6950.00	60	750	--	11.0	--

	211SRPN	78-07-06	7120.00	150	--	--	--	--
	211SRPN	78-07-28	7120.00	150	--	--	--	--
	211SRPN	78-08-10	7120.00	160	--	--	--	--
	211SRPN	78-08-30	7120.00	155	--	--	--	--
	211SRPN	78-10-13	7120.00	165	--	--	--	--
	211SRPN	78-10-25	7120.00	160	--	--	--	--
	211SRPN	78-11-01	7120.00	155	--	--	--	--
	211SRPN	78-12-13	7120.00	145	--	--	--	--
	211SRPN	79-03-07	7120.00	135	--	--	--	--
(D-16-7) 26BCA-S1	211SRPN	78-05-25	6860.00	23	--	--	--	--
	211SRPN	78-08-10	6860.00	19	--	--	11.0	--
	211SRPN	78-10-11	6860.00	19	--	--	11.0	--
	211SRPN	78-11-07	6860.00	19	--	--	10.5	--
	211SRPN	78-12-13	6860.00	19	--	--	10.0	--
	211SRPN	79-06-14	6860.00	10	--	--	11.0	--
	211SRPN	79-06-28	6860.00	10	720	8.0	11.0	--
	211SRPN	79-07-20	6860.00	9.3	660	7.0	11.5	--
	211SRPN	79-08-22	6860.00	21	750	--	10.5	--
	211SRPN	79-09-17	6860.00	19	750	--	10.5	--
	211SRPN	79-10-16	6860.00	20	680	--	11.5	--
(D-16-7) 26CBB-S1	211SRPN	78-08-10	6950.00	57	--	--	11.0	--
	211SRPN	78-10-11	6950.00	57	--	--	10.0	--
	211SRPN	78-11-07	6950.00	57	--	--	10.0	--
	211SRPN	78-12-13	6950.00	57	--	--	10.0	--
	211SRPN	79-05-10	6950.00	44	--	--	--	--
	211SRPN	79-06-28	6950.00	30	820	7.6	10.5	--
	211SRPN	79-07-16	6950.00	27	710	7.0	12.5	--
	211SRPN	79-09-18	6950.00	65	760	--	9.5	--
	211SRPN	79-10-18	6950.00	60	750	--	11.0	--

TABLE 7-4
Continued

(D-16-7) 27ADC-S1	211SRPN	78-08-10	7000.00	15	--	--	11.0	--
	211SRPN	78-10-11	7000.00	5.8	--	--	11.0	--
	211SRPN	78-11-07	7000.00	4.9	--	--	10.0	--
	211SRPN	78-12-13	7000.00	5.4	--	--	10.0	--
	211SRPN	79-05-10	7000.00	.0	--	--	--	--
	211SRPN	79-06-28	7000.00	.0	--	--	--	--
	211SRPN	79-08-22	7000.00	2.0	870	--	10.0	--
	211SRPN	79-09-18	7000.00	3.4	780	--	10.0	--
	211SRPN	79-10-18	7000.00	3.1	730	--	11.5	--
(D-16-7) 35ABC-S1	111ALVM	78-10-13	6620.00	22	--	--	--	--
	111ALVM	78-11-08	6620.00	20	--	--	--	--
	111ALVM	78-12-11	6620.00	23	--	--	--	--
	111ALVM	79-05-11	6620.00	26	--	--	--	--
	111ALVM	79-06-28	6620.00	20	960	8.1	10.5	--

111ALVM	79-07-20	6620.00	21	900	7.2	10.5	--
111ALVM	79-08-07	6620.00	35	760	7.3	11.0	--
111ALVM	79-08-22	6620.00	38	1080	--	10.0	--
111ALVM	79-08-31	6620.00	35	--	--	--	--
111ALVM	79-09-17	6620.00	40	1090	--	9.5	--
111ALVM	79-10-16	6620.00	32	850	--	11.0	--

TABLE 7-5

Chemical Analyses of Water from Selected Springs

Location	(D-16-7) 26adc-S1	(D-16-7) 26bca-S1	(D-16-7) 26cbb-S1	(D-16-7) 35abc-S1
Geologic Unit	211SRPN	211SRPN	211SRPN	111ALVM
Date of Sample	10-3-77	8-9-79	8-22-79	8-9-79
Altitude	7,120	6,860	6,950	6,620
Hardness (as $CaCO_3$)	320	380	440	510
Noncarbonate Hardness (as $CaCO_3$)	64	61	94	200
Discharge (gpm)	75	15	54	9.5
Specific Conductance	550	690	830	900
pH	6.8	7.5	7.2	7.7
Water Temperature (°C)	9.5	11.0	10.0	10.0
Dissolved* Calcium (as Ca)	78	83	82	92
Dissolved* Magnesium (as Mg)	30	42	58	69
Dissolved* Sodium (as Na)	4.1	6.6	21	24
Sodium* Absorption Ratio	.1	.1	.4	.5
Dissolved* Potassium (as K)	1.1	2.3	2.7	3.9
Bicarbonate* (as HCO_3)	310	--	--	--
Carbonate* (as CO_3)	0	--	--	--

TABLE 7-5
(continued)

Location	(D-16-7) 26adc-S1	(D-16-7) 26bca-S1	(D-16-7) 26cbb-S1	(D-16-7) 35abc-S1
Alkalinity* (as $CaCO_3$)	250	320	350	310
Dissolved* Sulfate (as SO_H)	26	71	140	190
Dissolved* Chloride (as Cl)	4.0	8.1	7.3	15
Dissolved* Fluoride (as F)	.1	.2	.2	.2
Dissolved* Silica (as SiO_2)	6.6	7.6	7.4	10
Dissolved Solids,* Sum of Constituents	303	414	530	591
Dissolved** Boron (as B)	20	80	30	70
Dissolved** Iron (as Fe)	--	0	20	0
Dissolved** Strontium (as Sr)	280	360	430	490

*units of milligrams/liter
**units of micrograms/liter

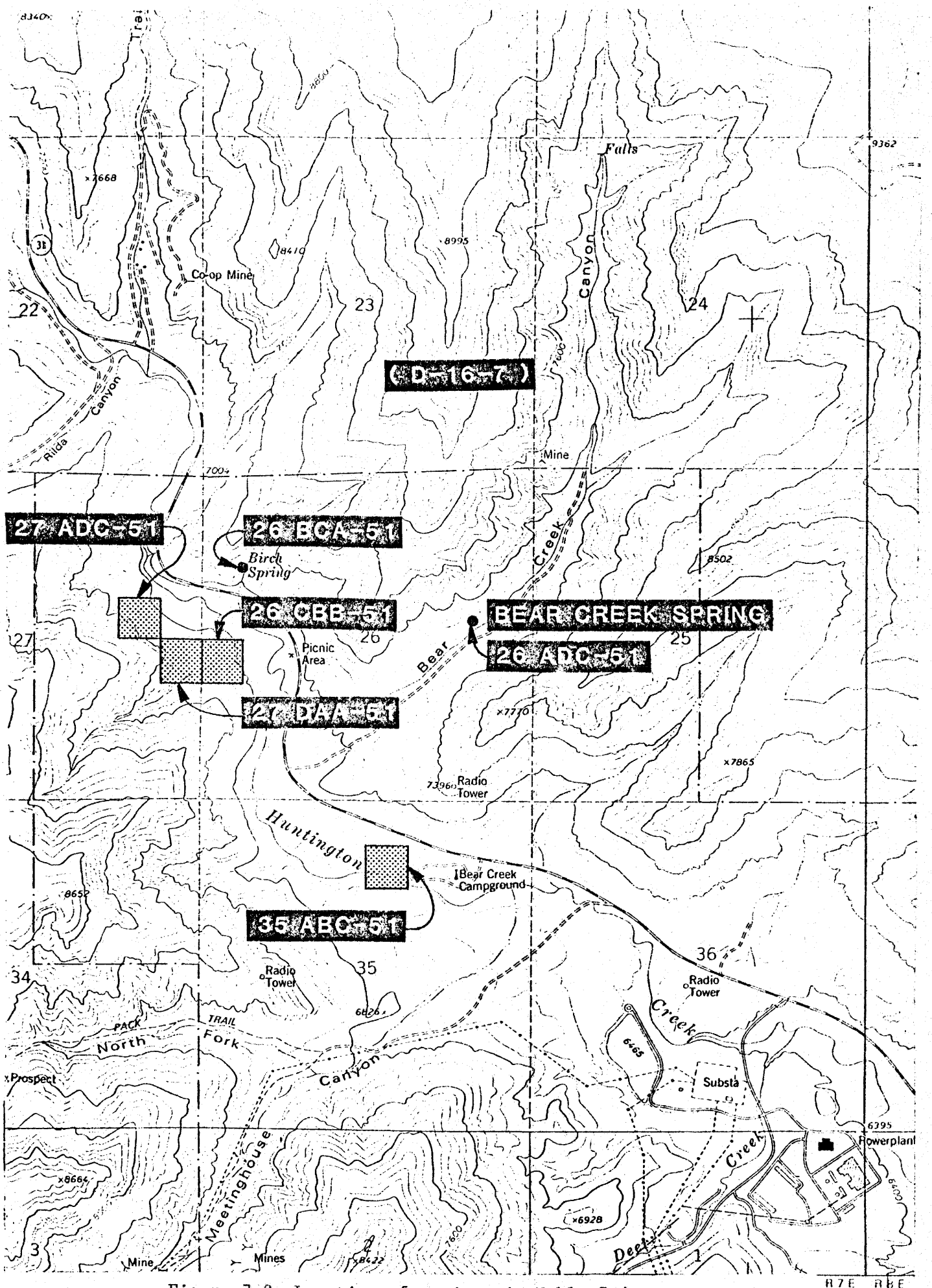

Figure 7-2 Location of springs in Table 7-4

selected springs. Tables 7-4 and 7-5 list the results of those measurements and analysis for the Bear Canyon Spring and for adjacent springs that were analyzed. (See Figure 7-2 for general locations of springs.)

7.1.3 EFFECTS OF MINING OPERATIONS ON GROUNDWATER

Danielson in the U.S.G.S. Open-file Report 81-539 states that:

> "The effects of underground coal mining on the water resources of the study area mainly are dependent on the amount of mine dewatering and the magnitude and a real extent of mine-related land subsidence....Where subsidence has not been extensive and where water-bearing zones that overlie the Star Point-Blackhawk aquifer are perched, it is unlikely that mine dewatering induces greater recharge to the groundwater system. Neither is it likely under these conditions that the flow of springs that issue from the perched zones or the rate of natural downward leakage into the Star Point-Blackhawk aquifer are affected by mine dewatering....It is unlikely that mine dewatering in the study area has had any adverse effect on the chemical quality of the groundwater."

The Bear Canyon Mine is a prime example of a mine with little subsidence and little mine dewatering, and what dewatering there is is from perched water zones. In addition Mr. Kaliser expressed the following:

> "In brief, my conclusion is that it is highly unlikely that the mine plan as presented to me by the Co-Op Company would interfere with the quantity or quality of any of those springs, particularly the one in question, the Bear Canyon Spring."

7.1.3.1 MINE DEWATERING

Water entering the mine will be stored in an underground tank and utilized for dust control on the roads and surface coal facilities and for

the mine bathhouse. Co-Op Mining Company possesses water rights for this purpose at the Trail Canyon portal and currently has an application before the State Water Rights Division to change the point of diversion to the Bear Canyon portal. If it becomes necessary to discharge the minewater other than as noted above it will be discharged to the sedimentation ponds. Co-Op Mining will monitor these discharges for quantity and quality.

7.1.3.2 MITIGATION AND CONTROL PLANS

An agreement between Huntington City and Co-Op Mining Company has been established to replace to the City any lost of culinary water from the Bear Canyon Spring, either in quality or quantity, due to mining operations, even though mining is highly unlikely to affect this spring.

Appendix 7-B contains a copy of this agreement between Huntington City and Co-Op Mining Company.

In the event that Co-Op Mining would need to replace water to Huntington City, the Company presently owns 300+ shares in the Huntington-Cleveland Irrigation Company and will purchase additional shares at some future date if necessary. In addition, Co-Op Mining Company carries liability insurance that includes coverage of water wells and springs (see Appendix 7-C).

7.1.3.3 GROUNDWATER MONITORING PLANS

If during mine operations, an inflow of groundwater is encountered from a point source with a sustained quantity of 1 gpm or greater over a 30-day period, a regular monitoring point of this groundwater will be maintained. Monitoring will be on a monthly basis. Samples will be taken of water quality and quantity with reporting done on a standard sampling chart. This monitoring will be carried out for a base-line period of one year or until the area is rendered inaccessible. In addition, the underground storage water will be monitored, and in the event discharging from the mine becomes necessary; discharged water will be monitored for quality and quantity. On a quarterly basis, a summary report will be submitted to DOGM which includes: a map of the underground working showing monitoring locations, identification of the source, sample qualities and quantities, and a narrative discussing current inflows, discharges, storage and uses of mine groundwater.

COP Development Spring, a small intermittent spring 300 feet northeast of Bear Creek Spring, will be monitored by Co-Op Mining (see plate 7-4).

Refer to 7.2.4 Surface Water Monitoring Plans for specifics on flow calculations and parameters tested for and refer to Figure 7-4 for reporting format.

Co-op Mining Co. Docket # 84-040
Cause # ACT/015/025

3.5.8.1 Projected Impacts of Subsidence

The surface of the area to be mined that might be impacted by subsidence is used primarily for cattle grazing and wildlife habitat. No known aquifer exists above the immediate coal zone. Buildings, conveyors, etc. for the mining operation are all located East of the coal field. In general the area is rugged with limited access and not readily accessible to the public. Subsidence is not expected to be significant at the depths involved in the new areas.

3.5.8.2 Control Measures to Mitigate Impacts

The impact of the observed subsidence will be evaluated and used as a guide in determining the need for control of subsidence and for mitigation. The need for subsidence control and for a specific mitigating measure will need to be site specific. The surface water supply will need to be protected or mitigating measures utilized if adverse impacts occur.

Subsidence control can be accomplished by several methods as needed, such as:

1) Not pulling pillars in selected sensitive areas (i.e. near outcrops).

2) Uniform extraction to minimize impacts.

Mitigating measures are limited in this relatively inaccessible area. Damage to any surface structures including fences and roads can be repaired. The mitigation of flow reductions or drying up of a water source must be site specific Flow from springs can be diverted or conveyed over a crack that might disrupt flow. Water can be supplied to the area if a critical need exists.

3.5.8.3 Subsidence Monitoring

A base map has been prepared showing contours and surface features that might be impacted by subsidence, such as surface structures and springs (Plate 3-3). The extent of

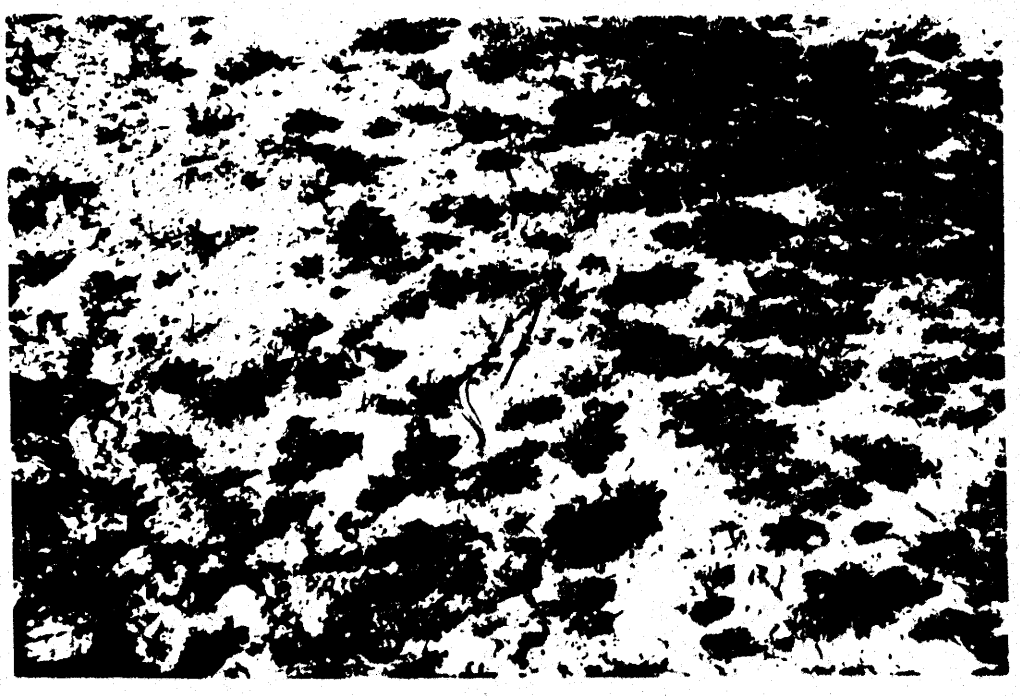

Fig. 1

Fig. 2

mining is shown on Plate 3-4 and the area where pillars will be removed is indicated.

This base map will be updated annually. Co-Op will notify adjacent property owners concerning subsidence potential prior to approaching their boudaries. Co-Op will conduct an annual survey to identify all evidence of subsidenc As annual field survey will be made to identify observable subsidence.

When subsidence is observed to adversely impact a surface structure or resource, the extent of the impact will be evaluated.

As pillars are pulled under the western portion of the mine plan area, impacts will be anticipated and hazards assessed on a site-specific basis. An overburden of approximately 1,000 feet or more in the western portion of the mine plan area should minimize surface impacts. Sandstone formations overlaying the Blackhawk coal bed should better distribute stresses and reduce the tendency for surface cracks and subsidence at the surface.

3.5.9 Waste Disposal Plans (Spoils, Coal Processing Wastes, Mine Development Wastes, Non-Coal Wastes, Removal, Handling and Storage

Co-op Mining Co. Docket # 84-040
Cause # ACT/015/025

UMC 784.16 Coal Processing waste

(d) Applicant anticipates 0 % waste per ton of coal processed.

The coal we anticipate mining is very clean, containing less than 8% ash. This is marketable as it comes out of the mine, t here will be no washing or other waste extraction process before it is sold and removed from the site. There will be no waste site prepared as this would unnecessarily disturb more area.

The reference to mine waste rock in the Bear Canyon application was placed there by mistake, and should have referred to the Trail Canyon operation. In Trail Canyon, we have been reclaiming an area previously abandoned, and in that area only, have we encountered the need to remove rock. The Bear Canyon mine does not have an area like that to be reclaimed.

Coal storage areas are being constructed with a better slope for proper drainage of water, and better protected from any water entering the area from another source to minimize the chance of conditions that result in spontanious combustion. Stockpiles will be monitored daily to detect if any fire has started. Fires that have started can best be extinguished by removing the overheated coal from the stockpile and spreading it out to cool off.

UMC 784.19 Underground development waste

The above paragraph on coal processing waste applies to underground development waste, except that any refuse will be placed in dumpsters that will be serviced regularly by the dumpster owners, scrap metal will be placed in scrap cargo boxes placed at the site by scrap metal dealers, and waste oil and grease will be placed in drums to be picked up by licensed waste oil collectors.

UMC 784.20 Subsidence control plan

Existance of structures above the mine area:

"The area is composed of precipitous step-like terrain (cliffs alternating with steep slopes) which posed numerous sometimes insurmountable access problems ---" Chapter VI, Exibit VI a, page 2, Bear Canyon application. Any attempt to construct buildings in this area would have certainly posed numerous and insurmountable problems. Also see enclosed photograph.

Aquifers and recharge areas. See Chapter VII, Exibit VII-a page 1 through 8, Bear Canyon application. (Testimony of qualified Hydrologist that no aquifers or regharge areas exist in or above the mine area.

Grazing lands. See enclosed copy of U S Forest Service range classification of the land above the mine area. Most of the area is classified 7, -"Includes those areas with an inherent lack of forage and contributes little or nothing to the support of livestock or big game." N-4 is classified -"N- Unsuitable Range Not Used, 4-Sagesbrush or rabbitbrush."

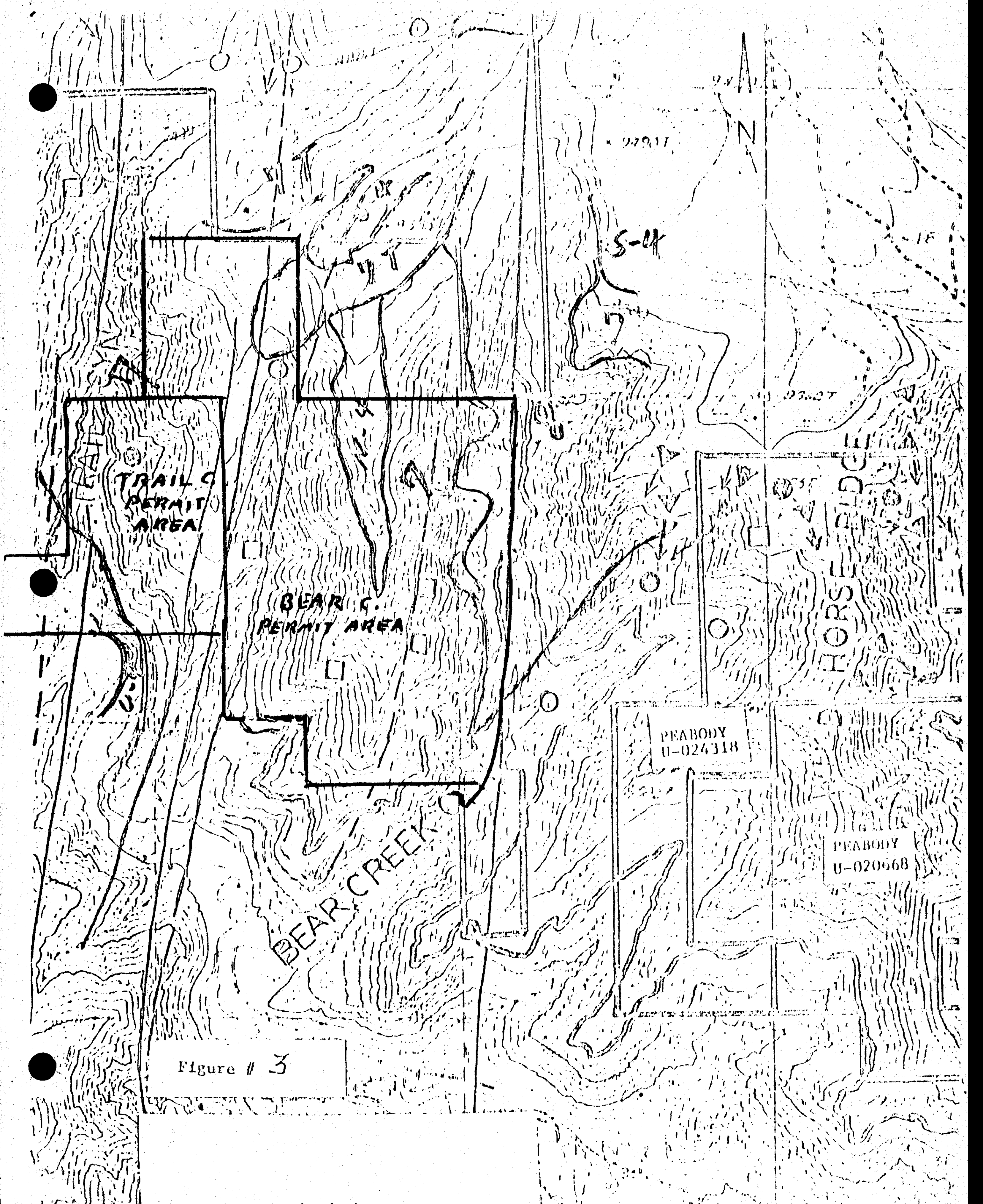
TRAIL C.
PERMIT
AREA
BEAR C.
PERMIT AREA
BEAR CREEK
PEABODY
U-024318
PEABODY
U-020668

Figure # 3

STATE OF UTAH
NATURAL RESOURCES
Oil, Gas & Mining

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Dr. G. A. (Jim) Shirazi, Division Director

4241 State Office Building • Salt Lake City, UT 84114 • 801-533-5771

November 8, 1983

Mr. Wendell Owen
Co-op Mining Company
P. O. Box 1245
Huntington, Utah 84528

RE: Bear Creek Canyon Mine
ACT/015/025, Folder No. 2
Emery County, Utah

Dear Mr. Owen:

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As the Division stated in its September 22, 1983 letter to you, we are committed to working with you in the issuance of a permanent program permit.

Sincerely,

Dianne R. Nielson

Dianne R. Nielson
Director

DRN/jvb

Enclosure

cc: Scott M. Matheson, Governor, Utah
James R. Harris, OSM
Allen D. Klein, OSM
Robert Hagen, OSM

COMPLIANCE SCHEDULE

Co-op Mining Company
Bear Creek Canyon Mine
ACT/015/025

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DRN/jvb

Enclosure

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DRN/jvb

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Enclosure

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